PERFORMANCE MEASURES FOR ACADEMIC DEPARTMENTS

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ABSTRACT

Measuring the performance of academic departments received little attention compared to other industries due to their complex nature and difficulty to measure their outputs. However, measures of performance are needed to asses whether they meet their set objectives and foster an environment of continuous improvement. The objective of this paper is to develop a performance measurement system for educational institutions. It outlines the properties of adequate performance measures and the steps for developing such measures in educational environment. Inputs and outputs for academic departments are considered as well as processes.

Keywords: *Performance measures, Education, Academic*

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1. INTRODUCTION

Educational institutes play essential role in development. They support global development strategies with the necessary highly qualified manpower and research. The success of educational institutes in achieving this role necessitates for them to have a strategic plan supported by a mechanism for monitoring, controlling and adjusting it. These institutions are comprised of academic departments (AD). The success of these institutions depends on the

performance of AD's in achieving their objectives. An essential component of the mechanism is a set of performance measures that are used to assess the organization performance and its ability to achieve set targets.

Academic departments are building blocks of educational institutions. They can be thought of as a unit with multiple inputs and outputs. The process of converting these inputs to outputs is complex in nature and also the outputs are hard to measure. Therefore, measuring the performance of academic departments is a challenging problem.

Performance measures must be based on a set of objectives that are linked to the mission of the department and its vision for the future. These define the customers and their requirements and the level that the organization needs to satisfy. It stimulates internal quality improvement and external comparison. It should measure things that can be changed (things that we can influence and improve). Performance measures should be based on outputs compared to inputs. Outputs of academic departments include research; projects, graduates and inputs include faculty, resources, equipment, etc. It should also include measures for the ability of the process used for achieving the goals of the educational institutions such as the teaching process and the administration process.

Developing a set of performance measures that is strongly linked to the objectives of the organization is essential for successful implementation of the strategic plan. It helps in monitoring strategic achievements and controlling strategic activities. AL-Turki and Duffuaa (2002) discuss the link between performance measurements and strategic planning. There are few papers in the literature of developing performance measures for educational institutions. Duffuaa et al. (1999), introduced an integrated approach for evaluation engineering and technical educational institution. They used the Data Envelopment Analysis approach. ABET 2000 criteria emphasizes the integrated strategic approach for evaluating engineering schools [Engineering Accreditation Commission Inc., 1998]. ABET gives some general guidelines for preparing self-assessment reports. Al-Anzi and Alatiqi (1999) introduced an integrated framework for self-assessment at the college of engineering and Petroleum in Kuwait University. They suggested five categories of performance measures: productivity, efficiency, effectiveness, internal structure and growth and development.

The objective of this paper is to introduce a performance measurement system for academic departments that take into consideration the special characteristics of academic departments. The next section discusses the special characteristics of academic departments and their typical objectives. It also introduces their components as inputs, processes and outputs. Section 3 discusses the characteristics of effective performance measures and procedure for developing such measures. Section 4 proposes a set of performance measure for each component. Section 5 discusses some requirements of performance measurement system and some implementation issues.

2. NATURE AND CHARECTERISTICS OF ACADEMIC DEPARTMENTS

Academic departments are service organizations and usually organized within educational institutes to provide education, conduct research and offer community services. Within the institutions, academic departments have a semi-antonymous status. In higher educational institutes, (universities and colleges), each department is chaired by a faculty member, who acts as a coordinator in managing the department activities. The responsibilities in academic departments are highly decentralized.

Typical objectives of academic departments include the following:

- Prepare highly qualified graduates (Bachelor. or Diploma) in the discipline of the department.

- Prepare graduates for lifelong learning experience.

- Prepare graduates who can communicate effectively and function well within a teamwork environment.

- Prepare graduates (Master and Doctor of Philosophy) who can conduct research at the frontier of their discipline.

- Extend the knowledge base in their disciplines to meet society needs.

- Provide continuous professional development for their graduate through continuous education, workshops and seminars.

To achieve the above objectives, academic departments have several inputs and processes that need to be available, monitored and continuously improved. The major inputs to an academic department include:

- Highly qualified, motivated and committed faculty members.

- Talented students with adequate background for the field of study.

- Adequate support staff.

- Well-designed curriculum.

- Well-equipped laboratories and computing facilities for certain disciplines.

- Facilities and library resources.

- Adequate procedures and standards.

The delivery of service in an academic department requires certain processes that are critical for achieving department's objectives. These processes include:

- Teaching processes.

- Managerial processes.

- Research supervision and support processes.

- Students support processes.

- Quality control processes.

The outputs of an academic department are qualified graduates, researcher, basic and applied research and services to society such as training and workshops. Measuring the quality and quantity of these outputs are not easy.

Adequate measures of performance are required to assess whether academic departments meet their set objectives in order to initiate improvements. In the past, measuring the performance of academic department has received little attention compared to other industries. Possible reasons include:

- The functions of academic departments within an organization, has complex relationships with other functions.

- The outputs of the academic departments are hard to measure.

In the next section an attempt will be made to develop adequate measures to assess the performance of an academic department.

3. CHARECTRISTICS OF ADEQUATE PERFORMANCE MEASURES

Performance measures should be based on a clear purpose linked to the goals and objectives of the department. The purpose should be to stimulate internal quality improvement and to benchmark performance with the leading academic departments. Performance measures should be clearly defined qualitatively and quantitatively and communicated to all concerned. Therefore, the characteristics of performance measures can be summarized as follows:

- *Relevance:* Include data that are essential to provide a basis for understanding the accomplishments of goals and objectives of the organization.

- *Interpretability:* Communicate in a readily understandable manner that is concise, yet comprehensive.

- *Timeliness:* Report in a timely manner so that it will be available to users before it loses its value in making decisions.

- *Reliability:* Report consistency from period to period.

- *Validity:* The measure should measure the intended quality indicator.

The major steps necessary to develop and evaluate a performance measurement can be outlined as follows [McNamara, 2000]:

1. Choosing areas to measure: The choice of the areas for assessment is based on three criteria: (1) the importance of the area (2) the potential for quality improvement, and (3) the degree to which the measure can be controlled for improvement. Other measurement criteria must also be considered such as the availability, accuracy, and completeness of data. There is no point of measuring performance in areas that are not significant to the quality of the output or the quality of the process or to measure areas where there is no potential for improvement. Also measuring things that cannot be controlled does not serve the strategies of the organization.

2. Selecting performance indicators: An indicator is a statement about the process or an outcome that is based on guidelines issued by specialty societies, government agencies or others. Class size and student GPA are two performance indicators related to the education process and education output respectively.

3. Designing specification for a measure: The standard approach is to state the indicator as a proportion, that is to define a numerator and a denominator. The target population for the measure should be defined clearly as well as the source of data. Measures for qualitative indicators such as satisfaction assessment, should be developed.

4. Testing the scientific strength of the measure: The scientific strength of a measure is determined by testing for reliability, validity and interpretability. A measure is reliable if, when repeatedly applied to the same population, the same result is obtained a high proportion of time. Reliability is important for insuring comparability of results among plans and over time within the same plan. Validity is the extent to which the measure accurately represents the quality being assessed. Interpretability refers to the ease with which the intended audience can understand and use the information generated by the measure.

4. PERFORMANCE MEASURES FOR ACADEMIC DEPARTMENTS

A performance measurement system should be developed for collecting, analyzing and reporting data and information related to the performance of the academic department. We propose a hierarchical system of performance measures so that at the top we have few measures that give a global indication of the department's performance. This is directly linked to the mission of the department and used by the University higher administration for assessing departments and colleges and allocating resources. The second level of the performance measurement system includes three major indicators for the three components, inputs, processes and outcomes. This level of the measurement system can be used by the college administration to assess departments within the college and allocate resources. The third level of the system includes all the detailed measures related to basic activities of the department. The three levels of the performance measurement system are shown in Figure 1.

In this section we will give a set of detailed performance measures (third level) that can be utilized to assess whether the academic department is accomplishing its mission and educational objectives. The performance measures cover outputs, processes and inputs. On this basis the performance measures are divided into three categories. The categories are:

1. Outcomes performance measures

2. Processes performance measures.

3. Input performance measures.

These performance measures are quantified by performance indices as shown below
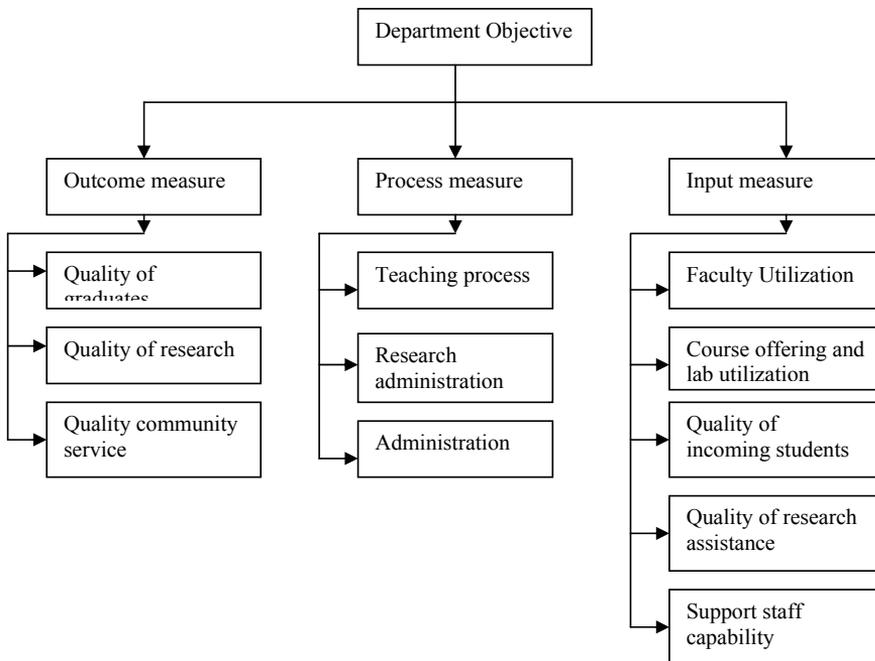
Figure 1. Performance measurement hierarchy

4.1 Outcome Performance Measures

Any academic department has three major outputs (outcomes). These are: Graduates, research and scholarship and services to the community in terms of training, projects and consultation. The outcome measures must reflect the quality of the output.

4.1.1 *Quality of graduates*

The performance measures for the quality of graduates assess the ability of the graduates to perform the educational objectives and outcomes set in the program. The measures in this sub-

category are obtained through well-designed employers and alumni surveys. The indices used to quantify the ability of students to perform program's objectives and outcomes are:

1. % of employers surveyed who agree or strongly agree that the graduates perform objective *i* very well, *(i=1,…,M)*, where *M* is the number of objectives. An over all measure can be obtained by aggregating the individual objective indices.

2. % of alumni surveyed who agree or strongly agree that graduates perform objective *i* very well, *(i=1,…M)*, where, *M* is the number of objectives. An over all measure can be obtained by aggregating the individual objective indices.

3. Median/average (maximum, minimum) major grade point average for graduating students in the last three years.

4. Median/average (maximum, minimum) yearly score in professional exams.

4.1.2   *Quality of research and scholarship*

The performance measures for research and scholarship assess the quality of research and Master and PhD students that are graduated from the department. The research consists of publications in refereed journals, referred conferences and research grants/projects. The indices that quantify these measures are:

1. Journal publication index (J.P.I) is the number of refereed papers per faculty per year. This index can further be refined to reflect the quality of the journals.

2. Conference publication index (C. P. I.) is the number of refereed conference papers per faculty per year. This index can further be refined to reflect the quality of the conference.

3. Research grant and project index (R.G.P.I) is the number of research grants and projects per faculty per year and total Saudi Riyals per faculty per year.

4. Graduate students supervision index (G.S.S.I) is the number of graduate students supervised per faculty per year.

5. Master thesis publication index (M.T.P.I) is the average number of papers published in refereed journal per thesis.

6. PhD thesis publication index (P.T.P.I) is the average number of paper published in refereed journal per thesis.

4.1.3   *Quality of services to community*

The performance measures for the quality of services assess the ability of the department to deliver quality services to the community. The quality of service is measured by the following indices:

1. Number of short courses per faculty per year.

2. % Faculty members participating in short courses per year.

3. Median/average short courses evaluation.

4. Number of industrial sponsored projects per faculty per year.

5. Number of consultancy jobs per faculty per year.

6. % Faculty members engaging in industrial consultancy.

4.2 Processes Performance Measures

There are key processes in the academic departments by which key activities are delivered. There are three key processes that need to be evaluated periodically and measure their performances. These processes are:

1. Teaching and learning process

2. Research administration process

3. Administration process

Several indices are proposed to measure the performances of these processes.

4.2.1 Teaching and learning process

The performance measures for the teaching and learning process is based on student input, peer review and curriculum development and can be measured with the following indices.

1. Median/average student evaluation for all courses.

2. % Faculty members awarded excellence in teaching.

3. Number of new course proposals per faculty per year.

4. Number of new book proposals per faculty per year.

4.2.2 Research administration process

The performance measures for research administration assess the ability of this process to foster a conducive environment for research. This is measured by the following indices:

1. Median/average time to approve a research proposal in months.

2. Median/average time to approve a conference application.

3. Median/average time to process a promotion case

4.2.3   Administration process

The performance measures for the administration process assess the ability of the department to deliver goals set and respond to higher administration solicited input. The performance is evaluated through the following indices:

1.   % Yearly goals achieved within planning horizon.

2.   % Requests for input responded to by deadline.

3.   Faculty level of satisfaction measured by the percentage of faculty members satisfied. (Obtained from faculty survey).

4.3   Input Measures

The input performance measures deal with the efficiency and utilization of the department resources in addition to the quality of incoming students, research assistants and support staff. The measures are divided in five groups according to the type of resource. The groups are:

1.   Faculty utilization

2.   Course offering and laboratory utilization

3.   Quality of incoming students

4.   Quality of research assistants

5.   Support staff capabilities

Several indices are developed for each group and given below.

4.3.1   Faculty utilization

The performance measures in this group deals with utilization of faculty members. The following indices are used to measure faculty utilization:

1.   Faculty student ratio

2.   Average (maximum, minimum) student credit hour per faculty per year.

3.   Number of graduate student under supervision per faculty per year.

4.   Number of committees per faculty per year.

4.3.2   Course offering and laboratory utilization

The performance measures for course offerings and laboratory utilization are quantified using the following indices:

1.   Course offering index (C.O.I) that is % course offered from planned course offering.

2.   Laboratory utilization index (L.U.I) that is % total student lab hours taught to total ideally available lab hours.

4.3.3   *Quality of incoming students*

The performance measures of incoming students are very essential. The following indices reflect the quality of students joining the department.

1.   Median/average (maximum, minimum) percentage in Saudi Certificate Examination for students joining the department.

2.   Median/average (maximum, minimum) yearly scores in university entrance exam for students joining the department.

3.   Median/average (maximum, minimum) yearly grade point average in preparatory year for students joining the department.

4.   Median/average (maximum, minimum) time to complete B.Sc. degree.

5.   Yearly success rate (% students obtaining more than 2.0 every semester). It can be broken into several indices based on major grade point average (G.P.A) for example % of students with $G.P.A \geq 3.0$, % of students with G.P.A between 2 and 3.

6.   Attrition rate % of students leaving the department due to failure or other reasons.

4.3.4   *Quality of graduate students and research assistance*

The performance measures of incoming graduate students are very essential for a successful graduate program that is expected achieve tits objectives. The following indices reflect the quality of graduate students and research Assistance (RA) joining the department.

1.   Median/average (highest, lowest) Graduate Record Examination (GRE) scores for graduate students and Research assistances (RA) joining the department.

2.   Median/average G. P. A for graduate students and RA's joining MS and Ph.D. programs.

3.   Median/average undergraduate G. P. A for graduate students and RA's joining MS and Ph.D. programs.

4.   Median/average time to complete MS and PhD programs.

4.3.5 *Support staff capabilities*

The performance measures for the support staff reflect the capability and quality of service the support staff is providing. The performance measures are quantified using the following indices:

1. Number of support staff (secretaries) per faculty.

2. Support staff (technician) per lab.

3. Support staff satisfaction index obtained from faculty survey, computed as the percentage of satisfied faculty from the support provided by the support staff.

5. IMPLEMENTATION

Most of the data needed for the performance measures are available internally and can be obtained from faculty and university administration. It should be collected and reported annually. However some performance measures need data extracted from internal and external resources through questionnaires. Such questionnaires should be designed carefully so that reliable and related information can be extracted. Collecting and analyzing the data needs a lot of effort and energy and it might end up to be an extra burden on faculty and administration which might be reflected negatively in their view of the system. To overcome this problem, performance measures should be carefully selected to avoid duplication and irrelevant measures should be eliminated. Furthermore the process of collecting, analyzing and reporting data should be automated and developed in an integrated academic information system.

6. CONCLUSION

It is important for the success of academic departments to have a performance measurement system based on a clear vision on a specified mission. Without performance measurement systems and performance indicators academic departments cannot improve and more importantly cannot cope with the changing environment in the market and advances in knowledge. Performance measurement is needed in benchmarking performance and setting the direction for the future. Therefore it is required to develop a performance measurement system that effectively captures all aspects and characteristics of academic departments.

Performance measures should relate input to outputs in all processes within academic departments. It should reflect efficient use of resources and effective generation and transfer of knowledge. Such performance measures for a typical academic department are introduced in this paper. Those measures should be tested by the department for relevance, reliability and availability of data. Some measures require conducting annual surveys of graduates, local companies, and faculty. The surveys should be carefully designed for extracting relevant data

in a timely manner. The process of collecting, analyzing and reporting data should be automated. The resulting information should feed back to a control mechanism to adjust current performance and also feedback to the strategic plan for setting up direction for the future.

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